

AWARD/CONTRACT		1. This Contract Is A Rated Order Under DPAS (15 CFR 700)		Rating DOA4		Page 1 Of 25	
2. Contract (Proc. Inst. Ident) No. W56HZV-04-C-0048		3. Effective Date 2003DEC19		4. Requisition/Purchase Request/Project No. SEE SCHEDULE			
5. Issued By TACOM WARREN BLDG 231 AMSTA-AQ-ABGD PHILLIP LAWRENCE (586)574-5273 WARREN, MICHIGAN 48397-5000 HTTP://CONTRACTING.TACOM.ARMY.MIL e-mail address: LAWRENCPT@TACOM.ARMY.MIL		Code W56HZV		6. Administered By (If Other Than Item 5) DCMA SPRINGFIELD BLDG 1, ARDEC PICATINNY, NJ 07806-5000 SCD C PAS NONE ADP PT HQ0337		Code S3101A	
7. Name And Address Of Contractor (No. Street, City, County, State, And Zip Code) UNITED SILICON CARBIDE, INC. 100 JERSEY AVE. BUILDING A, SUITE 208 NEW BRUNSWICK, NJ. 08901-3200 TYPE BUSINESS: Other Small Business Performing in U.S.				8. Delivery <input type="checkbox"/> FOB Origin <input checked="" type="checkbox"/> Other (See Below) SEE SCHEDULE			
				9. Discount For Prompt Payment			
				10. Submit Invoices (4 Copies Unless Otherwise Specified) To The Address Shown In:			
Code 1H9B2		Facility Code		12. Payment Will Be Made By DFAS - COLUMBUS CENTER DFAS-CO/NORTH ENTITLEMENT OPERATION P.O. BOX 182266 COLUMBUS OH 43218-2266		Item 12	
11. Ship To/Mark For SEE SCHEDULE		Code		12. Payment Will Be Made By DFAS - COLUMBUS CENTER DFAS-CO/NORTH ENTITLEMENT OPERATION P.O. BOX 182266 COLUMBUS OH 43218-2266		Code HQ0337	
13. Authority For Using Other Than Full And Open Competition: <input type="checkbox"/> 10 U.S.C. 2304(c)() <input type="checkbox"/> 41 U.S.C. 253(c)()				14. Accounting And Appropriation Data ACRN: AA 21 42040000046N6N7EP665502255Y S20113 W56HZV			
15A. Item No. SEE SCHEDULE	15B. Schedule Of Supplies/Services CONTRACT TYPE: Cost-Plus-Fixed-Fee	15C. Quantity	15D. Unit	15E. Unit Price	15F. Amount		
				KIND OF CONTRACT: Research and Development Contracts			
15G. Total Amount Of Contract						\$730,000.00	
16. Table Of Contents							
(X)	Section	Description	Page(s)	(X)	Section	Description	Page(s)
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X	C	Description/Specs./Work Statement	6	X	J	List of Attachments	25
X	D	Packaging and Marking	10	Part IV - Representations And Instructions			
X	E	Inspection and Acceptance	11		K	Representations, Certifications, and Other Statements of Offerors	
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X	H	Special Contract Requirements	16		M	Evaluation Factors for Award	
Contracting Officer Will Complete Item 17 Or 18 As Applicable							
17. <input checked="" type="checkbox"/> Contractor's Negotiated Agreement (Contractor is required to sign this document and return 2 signed copies to issuing office.) Contractor agrees to furnish and deliver all items or perform all the services set forth or otherwise identified above and on any continuation sheets for the consideration stated herein. The rights and obligations of the parties to this contract shall be subject to and governed by the following documents: (a) this award/contract, (b) the solicitation, if any, and (c) such provisions, representations, certifications, and specifications, as are attached or incorporated by reference herein. (Attachments are listed herein.)				18. <input type="checkbox"/> Award (Contractor is not required to sign this document.) Your offer on Solicitation Number _____ including the additions or changes made by you which additions or changes are set forth in full above, is hereby accepted as to the items listed above and on any continuation sheets. This award consummates the contract which consists of the following documents: (a) the Government's solicitation and your offer, and (b) this award/contract. No further contractual document is necessary.			
19A. Name And Title Of Signer (Type Or Print)				20A. Name Of Contracting Officer JOHN M. HOPFNER HOPFNERJ@TACOM.ARMY.MIL (586)574-7070			
19B. Name of Contractor By _____ (Signature of person authorized to sign)		19c. Date Signed		20B. United States Of America By _____/SIGNED/ (Signature of Contracting Officer)		20C. Date Signed 2003DEC19	

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Name of Offeror or Contractor: UNITED SILICON CARBIDE, INC.			

SECTION A - SUPPLEMENTAL INFORMATION

	Regulatory Cite	Title	Date
A-1	52.204-4850 (TACOM)	ACCEPTANCE APPENDIX	FEB/2002

(a) Contract Number W56HZV-04-C-0048 is awarded to United Silicon Carbide Inc.. The Government accepts your proposal dated 7May03 in response to Solicitation Number: 00.3, signed by Dr. George Lin , Vice President of your company.

Name of Offeror or Contractor: UNITED SILICON CARBIDE, INC.

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT								
0001	<p>SECTION B - SUPPLIES OR SERVICES AND PRICES/COSTS</p> <p><u>DELIVERABLE SERVICE</u></p> <p>SECURITY CLASS: Unclassified</p> <p>The negotiated cost of the contract is: Estimated Cost: \$677,852 Fixed Fee: \$ 52,148 Total CPFF: \$730,000</p> <p>See Sections B, F, and H clauses for further information on incremental funding and overall project delivery schedule.</p> <p>(End of narrative B001)</p>												
0001AA	<p><u>SERVICES LINE ITEM</u></p> <p>CLIN CONTRACT TYPE: Cost-Plus-Fixed-Fee NOUN: FY04 PHII SBIR UNITED SILICON PRON: E142C015EH PRON AMD: 01 ACRN: AA AMS CD: 665502M4055</p> <p>Supplies/Services to accomplish tasks located in Section C Scope of Work.</p> <p>(End of narrative B001)</p> <p><u>Inspection and Acceptance</u> INSPECTION: Destination ACCEPTANCE: Destination</p> <p><u>Deliveries or Performance</u></p> <table><tr><td>DLVR SCH</td><td></td><td>PERF COMPL</td></tr><tr><td><u>REL CD</u></td><td><u>QUANTITY</u></td><td><u>DATE</u></td></tr><tr><td>001</td><td>0</td><td>20-NOV-2004</td></tr></table> <p>\$ 365,000.00</p>	DLVR SCH		PERF COMPL	<u>REL CD</u>	<u>QUANTITY</u>	<u>DATE</u>	001	0	20-NOV-2004			\$ 365,000.00
DLVR SCH		PERF COMPL											
<u>REL CD</u>	<u>QUANTITY</u>	<u>DATE</u>											
001	0	20-NOV-2004											
0002	<p><u>DATA ITEM</u></p> <p>SECURITY CLASS: Unclassified</p>			\$ ** NSP **	\$ ** NSP **								

Name of Offeror or Contractor: UNITED SILICON CARBIDE, INC.

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	<p>Technical Data as set forth in Contract Data Requirements List (DD Form 1423) hereinafter referred to as Exhibit A.</p> <p>(End of narrative B001)</p> <p><u>Inspection and Acceptance</u> INSPECTION: Destination ACCEPTANCE: Destination</p>			Not Separately Priced	

B.1 Estimated Cost and Payment

B.1.1 The estimated cost for performance of the work required under this contract is \$677,852 which shall constitute the estimated cost for the purpose of the Contract Clause hereof entitled LIMITATION OF FUNDS.

B.1.2 Allowable cost shall be determined, and payment thereof shall be provided, in accordance with the Contract Clause hereof entitled ALLOWABLE COST AND PAYMENT.

B.2 Payment

The contractor may submit public vouchers bi-monthly for payment under this contract. The Paying Office shall disburse funds in accordance with paragraph G.18 of this contract entitled "Special Paying Instructions - Pay Oldest Money First (MAR2000)".

B.3 Funding

B.3.1 The Government shall provide funds under this contract covering the estimated cost hereof on an incremental basis as provided for in the following funding schedule and pursuant to the Contract Clause entitled LIMITATION OF FUNDS. It is estimated that the incremental amounts are sufficient for the performance of work in each of cited periods. The Government may, at its discretion, allot such funds on an incremental basis within each fiscal year. The contractor shall so plan and execute the work required by this contract as to expend and/or commit funds compatible with the schedule set forth below. Whenever the contractor has reason to believe that the funds allotted to this contract for any fiscal year are either insufficient or excessive for the performance of work required in that fiscal year, the Government shall be so notified.

B.3.2 Funding Schedule

<u>Performance Period</u>	<u>Amount</u>
FY04 - Award through Nov04	\$ 365,000
FY05 - Dec04 through Nov05	\$ 365,000

B.4 Funds Obligated. The amount of funds currently obligated to this contract is \$365,000.

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SECTION C - DESCRIPTION/SPECIFICATIONS/WORK STATEMENT
C. Statement of Work

Overview:

The objective of this Phase II SBIR is to develop cost-effective, high temperature, low thermal resistance power device packaging for power semiconductors. This improved power semiconductor packaging will enable lighter, more compact power converters and associated cooling systems in future FCS hybrid electric vehicles.

By using multiple size distributions of high thermal conductivity spherical particles to fill polymer/epoxy, particle packing density can be significantly increased. Filled epoxy produced by this method, called HT-2, has been demonstrated in Phase I contract DAAE07-03-C-L042 to have much higher thermal conductivity (16X) than unfilled epoxy, and significantly higher than that of conventional UL epoxy filled using one size distribution (approximately 3 times higher). This epoxy has been used to make molded power semiconductor packages with a correspondingly improved junction-to-case thermal resistance. This new method increases packing density and reduces thermal resistance but allows maintenance of viscosity at a level suitable to fabricate molded packages. By proper selection of particles and particle distributions, the thermal expansion of the epoxy can be closely matched to that of silicon and silicon carbide. This is essential to operate reliably at high temperature.

In this Phase II contract, HT-2 epoxy packing density and thermal conductivity will be further increased, and techniques to lower viscosity will be further developed. The HT-2 epoxy will be well characterized. Packages using HT-2 epoxy will be designed using 3-D finite element analysis (FEA) software to operate reliably at high temperatures, and high voltages. Molded HT-2 epoxy packages will be fabricated for silicon and silicon carbide devices. Packages will be thoroughly characterized for electrical and thermal performance. HT-2 package thermal performance will be compared to that of packages made from conventional silica-filled epoxy (or an epoxy with a similar thermal conductivity).

C.1. Task 1: Model Development and Computer Simulation.

Modeling and computer simulations will be used to predict what types of particle size distributions and how many size distributions are needed to achieve the highest possible packing density at acceptable viscosity. The Contractor shall conduct a theoretical study and compare various suitable modeling and simulation techniques. Techniques investigated and compared will include two 3-D approaches and a Monte Carlo approach. The 3-D approaches investigated will be the random-drop approach used in Phase I, and a modified random-drop approach which requires algorithms to allow particles to roll over other particles, drop again and roll again etc. The Contractor shall select and further develop the best approach with respect to accuracy of predictions, memory requirements, and computational times. Development of the non-selected approaches need only proceed as far as needed to identify the best method.

C.2. Task 2: HT-2 Epoxy Viscosity Dependence on Solvents, Dispersants and Surface Pre-treatment

The dependence of epoxy viscosity on type of solvent, dispersant, and surface pre-treatment will be investigated, and an effective process employing selected solvents, dispersants and particle surface pre-treatments will be developed to reduce viscosity and maintain it at a level suitable for making molded packages less than 60,000 cps at a sheer rate of 4/second.

- C2.1. Contractor shall identify a suitable solvent and percentage (volume ratio to epoxy) to be applied to fillers to reduce the viscosity of filled epoxy.
- C2.2. Contractor shall identify a suitable chemical for particle surface treatment and an effective method to apply it to fillers.
- C2.3. Contractor shall identify a suitable dispersant and conditions to utilize it to achieve a low viscosity for filled epoxy.
- C2.4. Contractor shall identify suitable conditions to prepare and fabricate HT-2 epoxy with low viscosity by combining solvent, chemical surface treatment and dispersant.

C.3. TASK 3: Development and Experimental Evaluation of HT-2 Epoxy

- C.3.1. Contractor shall develop HT-2 epoxy which demonstrates a factor of >=60X increased thermal conductivity of the filled HT-2 epoxy over that of the unfilled base epoxy, has a viscosity less than 60000 cps, and has a reasonable match of thermal expansion to SiC and silicon (close enough to allow reliable operation at specified temperatures).
- C3.2. Contractor shall measure the thermal conductivity, thermal expansion coefficient, and dielectric strength of HT-2 epoxy.

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C.4. TASK 4: Fabrication and Evaluation of SiC Devices for Packaging

Contractor shall fabricate the silicon carbide MPS (merged pn-Schottky) diodes or bi-metal Schottky diodes and SiC BJT (bipolar junction transistors) required for all measurements and deliverables. Contractor shall purchase silicon diodes and IGBT switches (insulated gate bipolar devices) required for all measurements and deliverables.

Contractor shall perform electrical and thermal measurements to characterize silicon carbide devices and silicon devices both before packaging and after packaging. This characterization will be performed in order to investigate the effects of packaging stress and thermal mismatch on device electrical performance and reliability. Characterization measurements will be performed over the expected operating temperature ranges of the devices.

Contractor shall perform DC (direct current) I-V (current-voltage) characteristics of silicon carbide and silicon diodes in the forward and reverse directions.

Contractor shall perform a systematic investigation of the silicon carbide BJT base-emitter junction I-V characteristics and ideality factor up to at least 200 degree C.

C.5. TASK 5: Package design and Molding Packaging of SiC and Si Devices

C.5.1.1. Package Design and Fabrication of Packaged Devices

Contractor shall design high temperature high-performance package for silicon carbide diodes and switches, and silicon diodes and switches. Contractor shall use commercially available thermal modeling software such as FLOTHERM or TAS design software to design packages and evaluate thermal performance. Finite element analysis shall be used to model the entire package. Modeling will be used to ensure that all packaging elements operate within their temperature limit. Package designs shall ensure good matching of thermal expansion of materials for reliability and consistent electrical performance, and shall include a detailed dimension layout.

Silicon packaging will be based on the standard TO-220 or similar type package dimensions and design. Contractor shall design the packaging of the silicon devices so that devices can operate at up to 100 degree C case temperature. Contractor shall design the packaging for silicon diodes and silicon switches to target a 20 ampere, 600 volt rating.

Contractor shall design the packaging of silicon carbide diodes and switches so that devices can operate at up to 200 degree C junction temperature. Contractor shall design two types of packaging for silicon carbide MPS diodes to operate at two different voltage/current regimes; one designed for lower voltage ratings (1200 volts, 5 amperes), and another designed for high voltage ratings (3000 volts, 3 amperes). Contractor shall design the packaging for the silicon carbide BJT to target a 1200 volt, 5 ampere rating. The contractor shall design the packaging of the silicon carbide devices so that devices can operate at up to 180 degree C case temperature.

C.5.1.2 Fabrication of Packaged Devices

Contractor shall fabricate packaged silicon and silicon carbide devices meeting the specifications in C.5.1.1 and C.6.2 in sufficient quantity for testing, evaluation and deliverables.

Contractor shall procure packaged devices or fabricate packaged devices of each type (silicon diodes, silicon switches, silicon carbide diodes, silicon carbide switches) that are packaged with epoxy having a thermal conductivity equal to that of the standard UL-rated silica filled epoxy (approximately range of 1W/m-K). Contractor shall obtain or produce a quantity sufficient to perform the testing and evaluation in C.4, C.5.2 and for deliverables specified in C.6.2.

C.5.2. Thermal and Electrical Evaluation of Packaged Devices and Comparison Study

Contractor shall perform a thorough evaluation of the electrical and thermal performance of HT-2 epoxy packaged devices and shall perform a comparison study with control devices packaged using epoxy having a thermal conductivity equal or similar to that of the standard UL-rated silica filled epoxy.

The evaluation will include a measurement of the thermal resistances of the packages and the effect of lower thermal resistance HT-2 epoxy in improving the electrical and thermal performance of the devices.

These studies shall establish the advantages of lower thermal resistance HT-2 packaging over standard UL-rated silica-filled epoxy with respect to:

- 1) the capability to operate at a higher case temperature, while operating at the same power,
- 2) the capability to operate at higher power, while operating at the same case temperature,

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3) the capability to operate reliably at high case temperatures up to 180 C.

C.6. TASK 6: Deliverables and Reports

C.6.1. Report Deliverables:

C.6.1.1. Six Quarterly Reports covering technical progress and status and results

C.6.1.2. Annual report.

One Detailed Annual Scientific and Technical Report shall be submitted 12 months after contract award. The Annual Scientific and Technical Report shall contain a detailed description of progress and status on all tasks.

C.6.1.3. Final Report

Contractor shall deliver 1 Draft Final Report 22 months after contract award.

Contractor shall deliver 1 Final Scientific and Technical Report within 30 days after receiving comments on the Draft Final Report.

Final Report shall contain:

Particle Packing Model explanation and documentation
HT-2 Epoxy development results
Package Designs
Device and Package Testing results
Plan for limited initial market introduction of HT-2 epoxy

C.6.2. Hardware Deliverables:

The HT2 epoxy used to fabricate the following deliverable devices shall have a thermal conductivity of at least 6 W/m-K . The HT2 epoxy used to fabricate the deliverable devices shall have the highest thermal conductivity that the contractor can repeatably produce. In each instance where the deliverables include items incorporating HT-2 epoxy and comparison item not including HT-2 epoxy, the two types shall be colored coded or otherwise marked to be easily distinguished between types and the contractor shall deliver the items with a sheet that gives the key to the color coding or other marking.

C.6.2.1. Two silicon diodes packaged using HT-2 epoxy and capable of reliable continuous operation at rated current (20A) at 100 degree C case temperature. Packaged devices will be rated at 600V.

C.6.2.2. For comparison, contractor shall deliver two of the same type of silicon diode dies packaged using conventional UL epoxy and rated at 20A, 600V. At the contractor's option, the devices for comparison may be fabricated using the same base epoxy as the HT-2, but with a thermal conductivity similar to that of conventional silica-filled epoxy.

C.6.2.3. Two silicon power switches packaged using HT-2 epoxy and capable of reliable continuous operation at rated current (20A) at 100 degree C case temperature. Packaged devices will be rated at 600V.

C.6.2.4. For comparison, contractor shall deliver two of the same type of silicon power switches packaged using conventional UL epoxy and rated at 20A, 600V. At the contractor's option, the devices for comparison may be fabricated using the same base epoxy as the HT-2 but with a thermal conductivity similar to that of conventional silica-filled epoxy.

C.6.2.5. Two silicon carbide diodes packaged with HT-2 epoxy and capable of reliable continuous operation at rated current (5A) at 180 degree C case temperature. Packaged devices will be rated at 1200V.

C.6.2.6. For comparison, contractor shall deliver two of the same type of silicon carbide diodes packaged using conventional UL epoxy and rated at 5A, 1200V. At the contractor's option, the devices for comparison may be fabricated using the same base epoxy as the HT-2 but with a thermal conductivity similar to that of conventional silica-filled epoxy.

C.6.2.7 Two silicon carbide diodes packaged with HT-2 epoxy and capable of reliable continuous operation at rated current (3A) at 180 degree C case temperature. Packaged devices will be rated at 3000V.

C.6.2.8. for comparison, contractor shall deliver two of the same type of silicon carbide diodes packaged using conventional UL epoxy and rated at 3A, 3000V. At the contractor's option, the devices for comparison may be fabricated using the same base epoxy as the HT-2 but with a thermal conductivity similar to that of conventional silica-filled epoxy.

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Name of Offeror or Contractor: UNITED SILICON CARBIDE, INC.

C.6.2.9. Two silicon carbide npn bipolar transistors packaged with HT-2 and capable of reliable continuous operation at rated current (5A) at 180 degree C case temperature. Packaged devices will be rated at 1200V.

C.6.2.10. For comparison, contractor shall deliver two of the same type of silicon carbide npn bipolar transistors packaged using conventional UL epoxy and rated at 5A, 1200V. At the contractors option, the devices for comparison may be fabricated using the same base epoxy as the HT-2 but with a thermal conductivity similar to that of conventional silica-filled epoxy.

C.6. 3. Software Deliverables:

The contractor shall deliver electronic copies in CD format and text copies of all software developed under this program.

C.6.4. Presentation Materials

The Contractor shall prepare and deliver presentation materials in accordance with CDRL A00X / DI-ADMN-81373. These presentation materials may be publicly displayed at government locations, or at professional or industry trade shows or conferences.

C.6.5 Shipping of deliverables

Contractor shall package and deliver device deliverables according to standard shipping methods appropriate to ensure integrity of devices.

C.7. Meetings:

C.7.1. Start of work meeting by phone within 30 days after contract award

C.7.2 Annual Meeting between 1 year and 1 year+ 30 days after contract award, to be held at TACOM. Two people from United Silicon Carbide, Inc. shall attend. At the discretion of the COR, the meeting may be held at the contractor's site.

C.7.3. Final Meeting to be held at TACOM before 24th month after contract award. Two people from United Silicon Carbide, Inc. shall attend. At the discretion of the COR, the meeting may be held at the contractor's site.

*** END OF NARRATIVE C 001 ***

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SECTION D - PACKAGING AND MARKING

SECTION D - PACKAGING AND MARKING

D.1. PACKAGING AND PACKING

All items deliverable under this contract shall be packaged and packed in accordance with standard commercial practice in order to assure arrival at Destination without damage or loss.

D.2 MARKING

All technical data deliverable under this contract shall be identified by the prime contractor, the contract number, the name and address of the prime contractor, and where applicable, the name and address of the subcontractor who generated the data._____

*** END OF NARRATIVE D 001 ***

Name of Offeror or Contractor: UNITED SILICON CARBIDE, INC.

SECTION E - INSPECTION AND ACCEPTANCE

	<u>Regulatory Cite</u>	<u>Title</u>	<u>Date</u>
E-1	52.246-9	INSPECTION OF RESEARCH AND DEVELOPMENT (SHORT FORM)	APR/1984
E-2	52.246-4030 (TACOM)	INSPECTION POINT: DESTINATION	AUG/1994

We'll make our Procurement Quality Assurance inspection at the destination(s) listed in the Schedule. We'll be checking the supplies to make sure they conform with applicable drawings and specifications.

[End of Clause]

E-3	52.246-4031 (TACOM)	ACCEPTANCE POINT: DESTINATION	AUG/1994
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The Government will accept the supplies at the destination(s) listed in the Schedule.

[End of Clause]

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SECTION F - DELIVERIES OR PERFORMANCE

	Regulatory Cite	Title	Date
F-1	52.242-15	STOP WORK ORDER--(ALTERNATE I dated APR 1984)	AUG/1989
F-2	52.247-34	F.O.B. DESTINATION	NOV/1991
	F.1.1 Data		
	F.1.2	The delivery schedule for the data items is found on Exhibit A, The Contract Data Requirements List (DD Form 1423).	
	F.1.3.	All data deliverables under this contract shall be delivered electronically to the email addresses specified in the Contract Data Requirements List (CDRL) DD Form 1423.	
	F.2	Period of Performance	
		The period of performance of this contract is 24 months from contract award to 30 Dec.05.	
	F.3	All hardware and documents shall be shipped FOB Destination to the following address:	
		U.S.Army TACOM 6501 E. 11 Mile Road Attn: AMSTA-TR-R/(Terence Burke) Mailstop 121 Warren Michigan, 48397-5000	
		All other deliverables must be sent by e-mail to the following addresses unless alternative arrangements are made with the Contracting Officer's Representative:	
		burkete@tacom.army.mil, and lawrencp@tacom.army.mil.	
	F.3.1	The contractor shall deliver the following:	
		Two silicon diodes packaged using HT-2 epoxy and capable of reliable continuous operation at rated current (20A) at 100 degree C case temperature rated at 600 volts.	Paragraphs C.6.2.1, 24 months after contract award
		Four of the same type of silicon diode dies packaged using conventional UL epoxy and rated at 50A 600V.	Paragraphs C.6.2.2 24 months after contract award.
		Two Silicon carbide diodes packaged with HT-2 epoxy and capable of reliable continuous operation at rated current (50A) at 180 degree C case temperature.	Paragraph C.6.2.5 24 months after contract award.
		Two silicon carbide diodes packaged using conventional UL epoxy and rated at 50 A 1200 volts	Paragraph C.6.2.6 24 months after contract award.
		Two silicon carbide diodes packaged with HT-2 epoxy and capable of reliable continuous operateion at rated current (3A) at 180 degree C case tmperature with packaged devices rated at 3000V.	Paragraph C.6.2.7 24 months after contract award.
		Two silicon carbide diodes packaged using conventional UL epoxy and rated at 3A, 3000V.	Paragraph C.6.2.8 24 months after contract award.
		Two silicon carbide npn bipolar transistors packaged with HT-2 and capable of reliable continuous operation at rated current (5A) at 180 degree C case temperature Packaged devices will be rated at 1200V.	Paragraph C.6.2.9 24 months after contract award.
		Two silicon carbide npn bipolar transistors packaged using conventional UL epoxy and rated at 5A, 1200V.	Paragraph C.6.2.10 24 Months after contract award.
		Software Data	Paragraph C.6.3 24 months after contract award.

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Presentation Materials	Paragraph C.6.4 24 months after contract award.
Quarterly Cost and performance reports	Paragraph C.6.1.1 Begining 90 days after contract award
Final Technical Report	Paragraph C.6.1.3 Draft final report due 45 days after final IPR final copy due 30 days after approval of draft

*** END OF NARRATIVE F 001 ***

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SECTION G - CONTRACT ADMINISTRATION DATA

LINE	PRON/ AMS CD/ MIPR	OBLG ACRN	STAT	ACCOUNTING CLASSIFICATION	JOB ORDER	ACCOUNTING STATION	OBLIGATED AMOUNT
0001AA	E142C015EH	AA	2	21 42040000046N6N7EP665502255Y S20113	42C015	W56HZV \$	365,000.00
	665502M4055						
						TOTAL \$	365,000.00

SERVICE NAME	TOTAL BY ACRN	ACCOUNTING CLASSIFICATION	ACCOUNTING STATION	OBLIGATED AMOUNT
Army	AA	21 42040000046N6N7EP665502255Y S20113	W56HZV	\$ 365,000.00
			TOTAL	\$ 365,000.00

Regulatory Cite	Title	Date
G-1	52.242-4016 (TACOM) COMMUNICATIONS	MAY/2000

(a) Communications on technical matters pertaining to the contract shall be direct between the contractor and the Technical Representative. Communications for the Technical Representative shall be addressed to:

Name: Terence Burke
e-mail: burkete@tacom.army.mil

(b) The Administrative Contracting Officer's (ACO) name and email address are also provided if known at this time:

ACO: Ms. Anita Cassett
e-mail: ACassett@dcmdc.dcma.mil

(c) Please see the appointment letters prepared at time of contract award for functions the Technical Representative and ACO will perform on this contract.

[End of Clause]

G-2	252.201-7000	CONTRACTING OFFICER'S REPRESENTATIVE	DEC/1991
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(a) Definition. Contracting Officer's Representative means an individual designated in accordance with subsection 201.602-2 of the Defense Federal Acquisition Regulation Supplement and authorized in writing by the contracting officer to perform specific technical or administrative functions.

(b) If the Contracting Officer designates a contracting officer's representative (COR), the Contractor will receive a copy of the written designation. It will specify the extent of the COR's authority to act on behalf of the contracting officer. The COR is not authorized to make any commitments or changes that will affect price, quality, quantity, delivery, or any other term or condition of the contract.

[End of Clause]

G-3	52.227-4004 (TACOM)	RELEASE OF INFORMATION	OCT/2003
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The contractor shall ensure that he complies with the requirements of Chapter 5, page 22, paragraph 5-48, of AR 360-1, The Army Public Affairs Program, dated 15 Oct 2000, prior to contemplated release of any procurement information. Approval of the Contracting Officer is required prior to release of any such information. AR 360-1 may be found at http://www.usapa.army.mil/pdffiles/r360_1.pdf .

[End of clause]

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G.4 (TACOM) SPECIAL PAYING INSTRUCTIONS: PAY OLDEST MONEY FIRST (MAR 2000)

This contract currently is funded (or later will be funded) by two or more separate funding documents, as shown in Section G of the contract by the presence of more than one long-line accounting classification for the Contract Line Item Numbers (CLINs) in the contract schedule. The funding represents (or later will represent) appropriations made available for obligation in more than one fiscal year.

In order for disbursements under the contract to be paid appropriately, the following requirements apply to the paying office:

The PAYING OFFICE: shall determine the total amount requested on each invoice or payment voucher received against the contract. Each payment shall be made against the oldest funding line(s) in the contract for which funds remain available. If the oldest fiscal year is represented by two or more accounting lines that still contain funds, payment shall be made equally against all accounting lines representing the oldest fiscal year until such lines are completely disbursed.

First example: the contract includes one accounting line from fiscal year 1999 and two accounting lines from fiscal year 2000. Result: disbursements against new invoices are made on the fiscal 1999 accounting line until it is completely disbursed, before any disbursements are made against the fiscal year 2000 accounting lines. Once disbursements start against the fiscal year 2000 lines, those payments will be split equally between the two available fiscal 2000 lines.

Second example: the contract includes four accounting lines from fiscal year 1999 and one accounting line from fiscal year 2000. Result: disbursements against new invoices are made and recorded equally against each of the four fiscal 1999 accounting lines. If one of the 1999 accounting lines becomes completely disbursed but money remains available on other 1999 lines, then payment on subsequent invoices will be made and recorded equally among the remaining 1999 lines until they become completely disbursed, before disbursements are made against the fiscal year 2000 line.

*** END OF NARRATIVE G 001 ***

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SECTION H - SPECIAL CONTRACT REQUIREMENTS

	Regulatory Cite	Title	Date
H-1	252.205-7000	PROVISION OF INFORMATION TO COOPERATIVE AGREEMENT HOLDERS	DEC/1991
H-2	252.225-7001	BUY AMERICAN ACT AND BALANCE OF PAYMENTS PROGRAM	APR/2003
H-3	252.225-7002	QUALIFYING COUNTRY SOURCES AS SUBCONTRACTORS	APR/2003
H-4	252.225-7004	REPORTING OF CONTRACT PERFORMANCE OUTSIDE THE UNITED STATES	APR/2003
H-5	252.225-7013	DUTY-FREE ENTRY	APR/2003
H-6	252.231-7000	SUPPLEMENTAL COST PRINCIPLES	DEC/1991
H-7	252.235-7011	FINAL SCIENTIFIC OR TECHNICAL REPORT	SEP/1999
H-8	252.242-7004	MATERIAL MANAGEMENT AND ACCOUNTING SYSTEM	DEC/2000
H-9	252.246-7000	MATERIAL INSPECTION AND RECEIVING REPORT	MAR/2003
H-10	252.246-7001	WARRANTY OF DATA	DEC/1991
H-11	52.204-4005 (TACOM)	REQUIRED USE OF ELECTRONIC CONTRACTING	DEC/2002

(a) All contract awards, modifications and delivery orders issued by TACOM will be issued electronically. The contractor has the option to receive these actions either via the Worldwide Web (WWW) or Electronic Data Interchange (EDI). Many provisions and clauses appear "by reference," meaning only clause titles and regulation site are listed; their full texts can be found at the website <http://farsite.hill.af.mil/>

(b) In order to be eligible to receive an award under this solicitation, the successful offeror must be registered with the Department of Defense (DOD) Central Contractor Registration (CCR). The CCR registration process may be done electronically at the World Wide Web (WWW) site: <http://www.ccr.gov/>. (In order to be registered to use EDI, you must use the long form for registration. Certification information, including information on the EDI 838 TPP, must be furnished to the Contracting Officer within 60 calendar days after contract award to complete networking requirements within the Government.)

(c) Worldwide Web Distribution. The contractor will receive an electronic Notice of the Award, Modification, or Delivery Order via e-mail. If you choose the WWW option, you must download the file from the appropriate TACOM webpage:

Warren: http://contracting.tacom.army.mil/awards_official.htm
Rock Island: <http://aaais.ria.army.mil/AAIS/AWDINFO/index.htm>
Picatinny: <http://procnet.pica.army.mil/Contracts/Index.htm>
Red River Army Depot: <http://www.redriver.army.mil/contracting/Awards>
Anniston Army Depot: <http://www.anadprocnet.army.mil>

(d) Electronic Data Interchange. If you choose to receive contract awards, modifications and delivery orders through EDI, they will be delivered electronically via the Federal Acquisition Network (FACNET). Federal Standard Version 3050 of Standard X12 from the American National Standards Institute (ANSI) will be used as the format for these electronic transactions.

(1) You must complete the EDI 838 Trading Partner Profile, and must agree (i) to subcontract with a DoD certified VAN or Value Added Service (VAS) provider, or (ii) to become DoD certified as a Value Added Network (VAN). The EDI 838 Training Partner Profile is contained in the basic CCR registration form and includes portions of the registration form which are titled "Optional".

(2) You must select a VAN from the official DoD approved list. DoD Certified VANs are listed at <http://www.acq.osd.mil/ec/ecip/index.htm>. If your VAN is later removed from the official list, or if you voluntarily drop your initially selected VAN, then you must switch to a VAN that remains on the official DoD approved list. You must maintain an active account on a DoD approved VAN for the entire duration of the contract, beginning no later than the 60th day after award.

(e) Unless otherwise specified elsewhere in the contract, all data items you are required to provide under this contract must be submitted electronically. Acceptable formats include:

(1) Microsoft* 97 Office Products (TACOM can currently read OFFICE 97* and lower.): Word, Excel, Powerpoint, or Access

(2) 100 OR 250 MEGABYTE ZIP*-DISK, 3 1/2 INCH DISK, OR 650 MEGABYTE CD ROM

(3) E-MAIL (Maximum size of each e-mail message is be three and one-half (3.5) megabytes).

(4) Other electronic formats. Before submitting your data in any other electronic format, please e-mail the buyer identified on the face of the contract, with e-mail copy-furnished to amsta-idq@tacom.army.mil, to obtain a decision as to the format's acceptability. This e-mail must be received by the buyer not later than ten calendar days before the required data submission date.

NOTE: The above formats may be submitted in compressed form using self-extracting files.

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(f) Additional information can be obtained by sending a message to: acqcenweb@tacom.army.mil or by calling (586) 574-7059.
[End of Clause]

H-12 52.246-4026 LOCAL ADDRESSES FOR DD FORM 250 MAR/2002
(TACOM)

(a) The contractor must provide a copy of each Material Inspection and Receiving Report (DD 250) pertaining to this contract, to the addresses given below, using either of the following methods:

(1) Our first preference is for you to use electronic mail (e-mail), using the following e-mail address:

DD250@tacom.army.mil

(2) Our second preference is for you to use data facsimile (datafax) transmission, using this fax number:

(586) 574-7552 and use "DD250 mailbox" in the "to:" block of your fax cover or header sheet.

In either method, do not mix DD250s from more than one contract in a single transmission. That is, you may submit multiple DD250s in a single transmission, but they must all be against the same contract.

(b) These copies meet the requirements for the Purchasing Office copy and the Army Inventory Control Manager copy listed in tables 1 and 2 of DFARS Appendix F.

(c) The DD250 form may be found, in three different formats, on the World Wide Web at <http://webl.whs.osd.mil/icdhome/DD-0999.htm>

[End of Clause]

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SECTION I - CONTRACT CLAUSES

This contract incorporates one or more clauses by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. Also, the full text of a clause may be accessed electronically at this address: <http://farsite.hill.af.mil/>

[End of Clause]

	Regulatory Cite	Title	Date
I-1	52.202-1	DEFINITIONS	DEC/2001
I-2	52.203-3	GRATUITIES	APR/1984
I-3	52.203-5	COVENANT AGAINST CONTINGENT FEES	APR/1984
I-4	52.203-6	RESTRICTIONS ON SUBCONTRACTOR SALES TO THE GOVERNMENT	JUL/1995
I-5	52.203-7	ANTI-KICKBACK PROCEDURES	JUL/1995
I-6	52.203-8	CANCELLATION, RESCISSION AND RECOVERY OF FUNDS FOR ILLEGAL OR IMPROPER ACTIVITY	JAN/1997
I-7	52.203-10	PRICE OR FEE ADJUSTMENT FOR ILLEGAL OR IMPROPER ACTIVITY	JAN/1997
I-8	52.203-12	LIMITATION ON PAYMENTS TO INFLUENCE CERTAIN FEDERAL TRANSACTIONS	JUN/2003
I-9	52.204-4	PRINTING/COPYING DOUBLE-SIDED ON RECYCLED PAPER	AUG/2000
I-10	52.209-6	PROTECTING THE GOVERNMENT'S INTEREST WHEN SUBCONTRACTING WITH CONTRACTORS DEBARRED, SUSPENDED, OR PROPOSED FOR DEBARMENT	JUL/1995
I-11	52.211-15	DEFENSE PRIORITY AND ALLOCATION REQUIREMENTS	SEP/1990
I-12	52.215-2	AUDIT AND RECORDS - NEGOTIATIONS	JUN/1999
I-13	52.215-10	PRICE REDUCTION FOR DEFECTIVE COST OR PRICING DATA	OCT/1997
I-14	52.215-11	PRICE REDUCTION FOR DEFECTIVE COST OR PRICING DATA--MODIFICATIONS	OCT/1997
I-15	52.215-12	SUBCONTRACTOR COST OR PRICING DATA	OCT/1997
I-16	52.215-13	SUBCONTRACTOR COST OR PRICING DATA -- MODIFICATIONS	OCT/1997
I-17	52.215-17	WAIVER OF FACILITIES CAPITAL COST OF MONEY	OCT/1997
I-18	52.215-18	REVERSION OR ADJUSTMENT OF PLANS FOR POSTRETIREMENT BENEFITS (PRB) OTHER THAN PENSIONS	OCT/1997
I-19	52.216-7	ALLOWABLE COST AND PAYMENT	DEC/2002
I-20	52.216-8	FIXED FEE	MAR/1997
I-21	52.219-8	UTILIZATION OF SMALL BUSINESS CONCERNS	OCT/2000
I-22	52.219-9	SMALL BUSINESS SUBCONTRACTING PLAN	JAN/2002
I-23	52.219-16	LIQUIDATED DAMAGES - SUBCONTRACTING PLAN	JAN/1999
I-24	52.222-1	NOTICE TO THE GOVERNMENT OF LABOR DISPUTES	FEB/1997
I-25	52.222-4	CONTRACT WORK HOURS AND SAFETY STANDARDS ACT--OVERTIME COMPENSATION	SEP/2000
I-26	52.222-20	WALSH-HEALEY PUBLIC CONTRACTS ACT	DEC/1996
I-27	52.222-21	PROHIBITION OF SEGREGATED FACILITIES	FEB/1999
I-28	52.222-26	EQUAL OPPORTUNITY	APR/2002
I-29	52.222-35	AFFIRMATIVE ACTION FOR DISABLED VETERANS AND VETERANS OF THE VIETNAM ERA	DEC/2001
I-30	52.222-36	AFFIRMATIVE ACTION FOR WORKERS WITH DISABILITIES	JUN/1998
I-31	52.222-37	EMPLOYMENT REPORTS ON SPECIAL DISABLED VETERANS, VETERANS OF THE VIETNAM ERA, AND OTHER ELIGIBLE VETERANS	DEC/2001
I-32	52.223-6	DRUG FREE WORKPLACE	MAY/2001
I-33	52.223-14	TOXIC CHEMICAL RELEASE REPORTING	AUG/2003
I-34	52.225-13	RESTRICTIONS ON CERTAIN FOREIGN PURCHASES	JUN/2003
I-35	52.226-1	UTILIZATION OF INDIAN ORGANIZATIONS AND INDIAN-OWNED ECONOMIC ENTERPRISES	JUN/2000
I-36	52.227-1	AUTHORIZATION AND CONSENT (ALTERNATE I dated April 1984)	JUL/1995
I-37	52.227-2	NOTICE AND ASSISTANCE REGARDING PATENT AND COPYRIGHT INFRINGEMENT	AUG/1996
I-38	52.227-11	PATENT RIGHTS--RETENTION BY THE CONTRACTOR (SHORT FORM)	JUN/1997
I-39	52.228-7	INSURANCE--LIABILITY TO THIRD PERSONS	MAR/1996
I-40	52.232-17	INTEREST	JUN/1996
I-41	52.232-22	LIMITATION OF FUNDS	APR/1984
I-42	52.232-23	ASSIGNMENT OF CLAIMS	JAN/1986
I-43	52.232-25	PROMPT PAYMENT	FEB/2002
I-44	52.232-33	PAYMENT BY ELECTRONIC FUNDS TRANSFER--CENTRAL CONTRACTOR REGISTRATION	OCT/2003
I-45	52.233-1	DISPUTES	JUL/2002
I-46	52.233-3	PROTEST AFTER AWARD -- (ALTERNATE I, dated JUN 1985)	AUG/1996
I-47	52.242-1	NOTICE OF INTENT TO DISALLOW COSTS	APR/1984
I-48	52.242-3	PENALTIES FOR UNALLOWABLE COSTS	MAY/2001
I-49	52.242-13	BANKRUPTCY	JUL/1995

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	Regulatory Cite	Title	Date
I-50	52.243-2	CHANGES--COST-REIMBURSEMENT (ALTERNATE V, dated April 1984))	AUG/1987
I-51	52.243-7	NOTIFICATION OF CHANGES	APR/1984
I-52	52.244-2	SUBCONTRACTS (ALT I--AUG 1998)	AUG/1998
I-53	52.244-5	COMPETITION IN SUBCONTRACTING	DEC/1996
I-54	52.245-5	GOVERNMENT PROPERTY (COST-REIMBURSEMENT, TIME-AND-MATERIAL, OR LABOR-HOUR CONTRACTS) (Deviation, per DAR Tracking Number 99-00008, 13 July 99)	JUN/2003
I-55	52.246-23	LIMITATION OF LIABILITY	FEB/1997
I-56	52.249-6	TERMINATION (COST-REIMBURSEMENT)	SEP/1996
I-57	52.249-14	EXCUSABLE DELAYS	APR/1984
I-58	52.253-1	COMPUTER GENERATED FORMS	JAN/1991
I-59	252.204-7003	CONTROL OF GOVERNMENT PERSONNEL WORK PRODUCT	APR/1992
I-60	252.209-7000	ACQUISITION FROM SUBCONTRACTORS SUBJECT TO ON-SITE INSPECTION UNDER THE INTERMEDIATE-RANGE NUCLEAR FORCES (INF) TREATY	NOV/1995
I-61	252.209-7004	SUBCONTRACTING WITH FIRMS THAT ARE OWNED OR CONTROLLED BY THE GOVERNMENT OF A TERRORIST COUNTRY per DoD interim rule, Federal Register 27 Mar 98	MAR/1998
I-62	252.211-7005	SUBSTITUTIONS FOR MILITARY OR FEDERAL SPECIFICATIONS AND STANDARDS	FEB/2003
I-63	252.215-7000	PRICING ADJUSTMENTS	DEC/1991
I-64	252.215-7002	COST ESTIMATING SYSTEM REQUIREMENTS	OCT/1998
I-65	252.219-7003	SMALL, SMALL DISADVANTAGED AND WOMEN-OWNED SMALL BUSINESS SUBCONTRACTING PLAN (DOD CONTRACTS)	APR/1996
I-66	252.225-7012	PREFERENCE FOR CERTAIN DOMESTIC COMMODITIES	FEB/2003
I-67	252.225-7014	PREFERENCE FOR DOMESTIC SPECIALTY METALS (ALT 1)	APR/2003
I-68	252.225-7016	RESTRICTION ON ACQUISITION OF BALL AND ROLLER BEARINGS	APR/2003
I-69	252.225-7025	RESTRICTION ON ACQUISITION OF FORGINGS	APR/2003
I-70	252.225-7031	SECONDARY ARAB BOYCOTT OF ISRAEL	APR/2003
I-71	252.227-7018	RIGHTS IN NONCOMMERCIAL TECHNICAL DATA AND COMPUTER SOFTWARE-- SMALL BUSINESS INNOVATIVE RESEARCH (SBIR) PROGRAM	JUN/1995
I-72	252.227-7030	TECHNICAL DATA--WITHHOLDING OF PAYMENT	MAR/2000
I-73	252.235-7010	ACKNOWLEDGEMENT OF SUPPORT AND DISCLAIMER	MAY/1995
I-74	252.243-7002	REQUESTS FOR EQUITABLE ADJUSTMENT	MAR/1998
I-75	252.244-7000	SUBCONTRACTS FOR COMMERCIAL ITEMS AND COMMERCIAL COMPONENTS (DoD CONTRACTS)	MAR/2000

I-76 52.222-2 PAYMENT FOR OVERTIME PREMIUMS JUL/1990
(a) The use of overtime is authorized under this contract if the overtime premium cost does not exceed 0% or the overtime premium is paid for work--

- (1) Necessary to cope with emergencies such as those resulting from accidents, natural disasters, breakdown of production equipment, or occasional production bottlenecks of a sporadic nature;
- (2) By indirect-labor employees such as those performing duties in connection with administration, protection, transportation, maintenance, standby plant protection, operation of utilities, or accounting;
- (3) To perform tests, industrial processes, laboratory procedures, loading or unloading of transportation conveyances, and operations in flight or afloat that are continuous in nature and cannot reasonably be interrupted or completed otherwise; or
- (4) That will result in lower overall costs to the Government.

(b) Any request for estimated overtime premiums that exceeds the amount specified above shall include all estimated overtime for contract completion and shall--

- (1) Identify the work unit; e.g., department or section in which the requested overtime will be used, together with present workload, staffing, and other data of the affected unit sufficient to permit the Contracting Officer to evaluate the necessity for the overtime;
- (2) Demonstrate the effect that denial of the request will have on the contract delivery or performance schedule;
- (3) Identify the extent to which approval of overtime would affect the performance or payments in connection with other Government contracts, together with identification of each affected contract; and
- (4) Provide reasons why the required work cannot be performed by using multishift operations or by employing additional personnel.

(End of clause)

I-77	52.219-4	NOTICE OF PRICE EVALUATION FOR HUBZONE SMALL BUSINESS CONCERNS	JAN/1999
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(a) Definition. HUBZone small business concern, as used in this clause, means a small business concern that appears on the List of Qualified HUBZone Small Business Concerns maintained by the Small Business Administration.

(b) Evaluation preference.

(1) Offers will be evaluated by adding a factor of 10 percent to the price of all offers, except-

(i) Offers from HUBZone small business concerns that have not waived the evaluation preference;

(ii) Otherwise successful offers from small business concerns;

(iii) Otherwise successful offers of eligible products under the Trade Agreements Act when the dollar threshold for application of the Act is exceeded (see 25.402 of the Federal Acquisition Regulation (FAR)); and

(iv) Otherwise successful offers where application of the factor would be inconsistent with a Memorandum of Understanding or other international agreement with a foreign government.

(2) The factor of 10 percent shall be applied on a line item basis or to any group of items on which award may be made. Other evaluation factors described in the solicitation shall be applied before application of the factor.

(3) A concern that is both a HUBZone small business concern and a small disadvantaged business concern will receive the benefit of both the HUBZone small business price evaluation preference and the small disadvantaged business price evaluation adjustment (see FAR clause 52.219-23). Each applicable price evaluation preference or adjustment shall be calculated independently against an offeror's base offer. These individual preference amounts shall be added together to arrive at the total evaluated price for that offer.

(c) Waiver of evaluation preference. A HUBZone small business concern may elect to waive the evaluation preference, in which case the factor will be added to its offer for evaluation purposes. The agreements in paragraph (d) of this clause do not apply if the offeror has waived the evaluation preference.

[] Offer elects to waive the evaluation preference.

(d) Agreement. A HUBZone small business concern agrees that in the performance of the contract, in the case of a contract for

(1) Services (except construction), at least 50 percent of the cost of personnel for contract performance will be spent for employees of the concern or employees of other HUBZone small business concerns;

(2) Supplies (other than procurement from a nonmanufacturer of such supplies), at least 50 percent of the cost of manufacturing, excluding the cost of materials, will be performed by the concern or other HUBZone small business concerns;

(3) General construction, at least 15 percent of the cost of the contract performance incurred for personnel will be spent on the concern's employees or the employees of other HUBZone small business concerns; or

(4) Construction by special trade contractors, at least 25 percent of the cost of the contract performance incurred for personnel will be spent on the concern's employees or the employees of other HUBZone small business concerns.

(e) A HUBZone joint venture agrees that in the performance of the contract, the applicable percentage specified in paragraph (d) of this clause will be performed by the HUBZone small business participant or participants;

(f) A HUBZone small business concern nonmanufacturer agrees to furnish in performing this contract only end items manufactured or produced by HUBZone small business manufacturer concerns. This paragraph does not apply in connection with construction or service contracts.

[End of Clause]

I-78 52.223-11 OZONE-DEPLETING SUBSTANCES

MAY/2001

(a) Definition. Ozone-depleting substance, as used in this clause, means any substance the Environmental Protection Agency designates in 40 CFR part 82 as--

(1) Class I, including, but not limited to, chlorofluorocarbons, halons, carbon tetrachloride, and methyl chloroform; or

(2) Class II, including but not limited to, hydrochlorofluorocarbons.

(b) The Contractor shall label products which contain or are manufactured with ozone-depleting substances in the manner and to the

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extent required by 42 U.S.C. 7671j(b), (c), and (d) and 40 CFR Part 82, Subpart E, as follows:

WARNING: Contains (or manufactured with, if applicable) _____ * _____, a substance(s) which harm(s) public health and environment by destroying ozone in the upper atmosphere.

*The Contractor shall insert the name of the substance(s).

[End of Clause]

I-79 52.252-6 AUTHORIZED DEVIATIONS IN CLAUSES APR/1984

(a) The use in this solicitation or contract of any Federal Acquisition Regulation (48 CFR Chapter 1) clause with an authorized deviation is indicated by the addition of (DEVIATION) after the date of the clause.

(b) The use in this solicitation or contract of any DoD FAR Supplement (DFARS) (48 CFR 2) clause with an authorized deviation is indicated by the addition of (DEVIATION) after the name of the regulation.

[End of Clause]

I-80 252.204-7004 REQUIRED CENTRAL CONTRACTOR REGISTRATION NOV/2001

(a) Definitions. As used in this clause--

(1) Central Contractor Registration (CCR) database means the primary DoD repository for contractor information required for the conduct of business with DoD.

(2) Data Universal Numbering System (DUNS) number means the 9-digit number assigned by Dun and Bradstreet Information Services to identify unique business entities.

(3) Data Universal Numbering System +4 (DUNS+4) number means the DUNS number assigned by Dun and Bradstreet plus a 4-digit suffix that may be assigned by a parent (controlling) business concern. This 4-digit suffix may be assigned at the discretion of the parent business concern for such purposes as identifying subunits or affiliates of the parent business concern.

(4) Registered in the CCR database means that all mandatory information, including the DUNS number or the DUNS+4 number, if applicable, and the corresponding Commercial and Government Entity (CAGE) code, is in the CCR database; the DUNS number and the CAGE code have been validated; and all edits have been successfully completed.

(b)

(1) By submission of an offer, the offeror acknowledges the requirement that a prospective awardee must be registered in the CCR database prior to award, during performance, and through final payment of any contract resulting from this solicitation, except for awards to foreign vendors for work to be performed outside the United States.

(2) The offeror shall provide its DUNS or, if applicable, its DUNS+4 number with its offer, which will be used by the Contracting Officer to verify that the offeror is registered in the CCR database.

(3) Lack of registration in the CCR database will make an offeror ineligible for award.

(4) DoD has established a goal of registering an applicant in the CCR database within 48 hours after receipt of a complete and accurate application via the Internet. However, registration of an applicant submitting an application through a method other than the Internet may take up to 30 days. Therefore, offerors that are not registered should consider applying for registration immediately upon receipt of this solicitation.

(c) The Contractor is responsible for the accuracy and completeness of the data within the CCR, and for any liability resulting from the Government's reliance on inaccurate or incomplete data. To remain registered in the CCR database after the initial registration, the Contractor is required to confirm on an annual basis that its information in the CCR database is accurate and complete.

(d) Offerors and contractors may obtain information on registration and annual confirmation requirements by calling 1-888-227-2423, or via the Internet at <http://www.ccr.gov>.

[End of Clause]

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I-81 252.225-7015 PREFERENCE FOR DOMESTIC HAND OR MEASURING TOOLS DEC/1991
The Contractor agrees to deliver under this contract only hand or measuring tools produced in the United States or its possessions.
(End of clause)

I-82 252.247-7023 TRANSPORTATION OF SUPPLIES BY SEA MAY/2002
(a) Definitions. As used in this clause--

(1) Components means articles, materials, and supplies incorporated directly into end products at any level of manufacture, fabrication, or assembly by the Contractor or any subcontractor.

(2) Department of Defense (DoD) means the Army, Navy, Air Force, Marine Corps, and defense agencies.

(3) Foreign flag vessel means any vessel that is not a U.S.-flag vessel.

(4) Ocean transportation means any transportation aboard a ship, vessel, boat, barge, or ferry through international waters.

(5) Subcontractor means a supplier, materialman, distributor, or vendor at any level below the prime contractor whose contractual obligation to perform results from, or is conditioned upon, award of the prime contract and who is performing any part of the work or other requirement of the prime contract. However, effective May 1, 1996, the term does not include a supplier, materialman, distributor, or vendor of commercial items or commercial components.

(6) Supplies means all property, except land and interests in land, that is clearly identifiable for eventual use by or owned by the DoD at the time of transportation by sea.

(i) An item is clearly identifiable for eventual use by the DoD if, for example, the contract documentation contains a reference to a DoD contract number or a military destination.

(ii) Supplies includes (but is not limited to) public works; buildings and facilities; ships; floating equipment and vessels of every character, type, and description, with parts, subassemblies, accessories, and equipment; machine tools; material; equipment; stores of all kinds; end items; construction materials; and components of the foregoing.

(7) U.S.-flag vessel means a vessel of the United States or belonging to the United States, including any vessel registered or having national status under the laws of the United States.

(b)

(1) The Contractor shall use U.S.-flag vessels when transporting any supplies by sea under this contract.

(2) A subcontractor transporting supplies by sea under this contract shall use U.S.-flag vessels if-

(i) This contract is a construction contract; or

(ii) The supplies being transported are-

(A) Noncommercial items; or

(B) Commercial items that-

(1) The Contractor is reselling or distributing to the Government without adding value (generally, the Contractor does not add value to items that it subcontracts for f.o.b. destination shipment);

(2) Are shipped in direct support of U.S. military contingency operations, exercises, or forces deployed in humanitarian or peacekeeping operations; or

(3) Are commissary or exchange cargoes transported outside of the Defense Transportation System in accordance with 10 U.S.C. 2643.

(c) The Contractor and its subcontractors may request that the Contracting Officer authorize shipment in foreign-flag vessels, or designate available U.S.-flag vessels, if the Contractor or a subcontractor believes that--

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Name of Offeror or Contractor: UNITED SILICON CARBIDE, INC.

- (1) U.S.-flag vessels are not available for timely shipment;
- (2) The freight charges are inordinately excessive or unreasonable; or
- (3) Freight charges are higher than charges to private persons for transportation of like goods.

(d) The Contractor must submit any request for use of other than U.S.-flag vessels in writing to the Contracting Officer at least 45 days prior to the sailing date necessary to meet its delivery schedules. The Contracting Officer will process requests submitted after such date(s) as expeditiously as possible, but the Contracting Officer's failure to grant approvals to meet the shipper's sailing date will not of itself constitute a compensable delay under this or any other clause of this contract. Requests shall contain at a minimum--

- (1) Type, weight, and cube of cargo;
- (2) Required shipping date;
- (3) Special handling and discharge requirements;
- (4) Loading and discharge points;
- (5) Name of shipper and consignee;
- (6) Prime contract number; and

(7) A documented description of efforts made to secure U.S.-flag vessels, including points of contact (with names and telephone numbers) with at least two U.S.-flag carriers contacted. Copies of telephone notes, telegraphic and facsimile message or letters will be sufficient for this purpose.

(e) The Contractor shall, within 30 days after each shipment covered by this clause, provide the Contracting Officer and the Division of National Cargo, Office of Market Development, Maritime Administration, U.S. Department of Transportation, Washington, DC 20590, one copy of the rated on board vessel operating carrier's ocean bill of lading, which shall contain the following information--

- (1) Prime contract number;
- (2) Name of vessel;
- (3) Vessel flag of registry;
- (4) Date of loading;
- (5) Port of loading;
- (6) Port of final discharge;
- (7) Description of commodity;
- (8) Gross weight in pounds and cubic feet if available;
- (9) Total ocean freight in U.S. dollars; and
- (10) Name of the steamship company.

(f) The Contractor shall provide with its final invoice under this contract a representation that to the best of its knowledge and belief--

- (1) No ocean transportation was used in the performance of this contract;
- (2) Ocean transportation was used and only U.S.-flag vessels were used for all ocean shipments under the contract;

(3) Ocean transportation was used, and the Contractor had the written consent of the Contracting Officer for all non-U.S.-flag ocean transportation; or

(4) Ocean transportation was used and some or all of the shipments were made on non-U.S.-flag vessels without the written consent of the Contracting Officer. The Contractor shall describe these shipments in the following format:

CONTINUATION SHEET	Reference No. of Document Being Continued PIIN/SIIN W56HZV-04-C-0048 MOD/AMD	Page 24 of 25
Name of Offeror or Contractor: UNITED SILICON CARBIDE, INC.		

ITEM DESCRIPTION	CONTRACT LINE ITEMS	QUANTITY	TOTAL
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(g) If the final invoice does not include the required representation, the Government will reject and return it to the Contractor as an improper invoice for the purposes of the Prompt Payment clause of this contract. In the event there has been unauthorized use of non-U.S.-flag vessels in the performance of this contract, the Contracting Officer is entitled to equitably adjust the contract, based on the unauthorized use.

(h) In the award of subcontracts for the types of supplies described in paragraph (b)(2) of this clause, the Contractor shall flow down the requirements of this clause as follows:

(1) The Contractor shall insert the substance of this clause, including this paragraph (h) in all subcontracts that exceed the simplified acquisition threshold in Part 2 of the Federal Acquisition Regulation.

(2) The Contractor shall insert the substance of paragraphs (a) through (e) of this clause, and this paragraph (h), in subcontracts that are at or below the simplified acquisition threshold in Part 2 of the Federal Acquisition Regulation.

[End of Clause]

I-83	52.204-4009 (TACOM)	MANDATORY USE OF CONTRACTOR TO GOVERNMENT ELECTRONIC COMMUNICATION	JUN/1999
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(a) All references in the contract to the submission of written documentation shall mean electronic submission. All electronic submissions shall be in the formats and media described in the "Electronic Quotations/Offers/Bids Required in Response to this Request for Quotations/Proposals/Bids" clause elsewhere in this document. (See Section K for commercial acquisitions, Section L for RFPs, and Section I for RFQs.)

(b) This shall include all written unclassified communications between the Government and the Contractor except contract awards and contract modifications which shall be posted on the internet. Return receipt shall be used if a commercial application is available. Classified information shall be handled in full accordance with the appropriate security requirements.

(c) In order to be contractually binding, all Government communications requiring a Contracting Officer signature must be sent from the Contracting Officer's e-mail address. The Contractor shall designate the personnel with signature authority who can contractually bind the contractor. All binding contractor communication shall be sent from this contractor e-mail address(es).

(d) Upon award, the Contractor shall provide the Contracting Officer with a list of e-mail addresses for all administrative and technical personnel assigned to this contract.

(e) Unless exempted by the Procuring Contracting Officer in writing, all unclassified written communication after contract award shall be transmitted electronically.

[End of Clause]

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Name of Offeror or Contractor: UNITED SILICON CARBIDE, INC.			

SECTION J - LIST OF ATTACHMENTS

<u>List of</u> <u>Addenda</u>	<u>Title</u>	<u>Date</u>	<u>Number</u> <u>of Pages</u>	<u>Transmitted By</u>
Exhibit A	DD FORM 1423 CONTRACT DATA REQUIREMENT LIST	26-AUG-2003	005	

DD Form 1423, SEP 97 (EG) (Computer Generated)

Previous Editions Are Obsolete

Page of Pages

CONTRACT DATA REQUIREMENT LIST

Form Approval OMB No. 0704-0188 Public reporting burden for this collection of information is estimated to average 440 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503. Please DO NOT RETURN your form to either these addresses. Send completed form to the Government Issuing Contracting Officer for the Contract/PR No. listed in Block E.A. CONTRACT LINE ITEM NO.: D. SYSTEM/ITEM.....: B. EXHIBIT: AE. CONTRACT/PR NO.: DAAE07-03-C-L042C. CATEGORY.....: F. CONTRACTOR. United Silicon Carbide Inc. 1. DATA ITEM NO.: A0012. TITLE OF DATA ITEM: Contractors Progress, Status, and Management Report 3. SUBTITLE: Phase I Progress Reports 4. AUTHORITY: DI-MGMT-80227 5. CONTRACT REFERENCE: Section C.2.a 6. REQUIRING OFFICE: AMSTA-TR-R 9. DIST. STATEMENT REQUIRED.: 12. DATE OF FIRST SUB.: See Block 16 7. DD250 REQ: DD 10. FREQUENCY: See Block 16 13. DATE OF SUBS. SUB...: See Block 16 8. APP CODE: 11. AS OF DATE: See Block 16 14. DISTRIBUTION A. ADDRESSEES

B. COPIES:DRAFTFINALTerence Burke, Contracting Officers Representative (COR), E-mail:

burkete@tacom.army.mil

1Phil Lawrence, Contract Specialist, E-Mail: Lawrencp@tacom.army.mil

1 15. TOTAL: 1 * * In distributing the electronic report, according to the schedule in Block 16 below, the Contractor shall deliver one (1) copy to the Government, sent to Terence Burke, Phil Lawrence, . 16. REMARKS:

a. Basic Period: The Contractor shall deliver two (2) progress reports in the Phase I, Basic Period: the first report by two (2) months after the contract award date, and the second report by four (4) months after the contract award date.

b. Option Period: The Contractor shall deliver one (1) progress report within the option performance period. If the Government exercises the option before the end of the Phase I Basic Period, the Contractor shall deliver one (1) progress report sixty (60) days from the end of the Phase I Basic Period. If the Government exercises the option after the end of the Phase I Basic Period, the Contractor shall deliver one (1) progress report within sixty (60) days after the option exercise date.

c. These instructions apply to both Basic Period and Option Period Progress Reports: Complete the reports in accordance with (IAW) Data Item Description (DID) DI-MGMT-80227, Contractors Progress, Status, and Management Report. The COR is responsible for accepting or rejecting the Contractors Progress, Status, and Management Reports. See DID DI-MGMT-80227, at the internet address below, for instructions on completing the required report.

<http://astimage.daps.dla.mil/docimages/0001\48\17\DI80227.PD8>

d. Prepare the reports in the Contractors format. Submit the reports using any of the following electronic formats:

(1) Files readable using these Microsoft* 97 Office Products (TACOM can currently read OFFICE 97* and lower): Word, Excel, PowerPoint, or Access. Spreadsheets must be sent in a file format that includes all formulae, macro and format information. Print image is not acceptable. Executable files, other than self-extracting compressed files, are unacceptable.

(2) Files in Adobe PDF (Portable Document Format). Scanners should be set to 200 dots per inch.

(3) Files in HTML (Hypertext Markup Language). HTML documents must not contain active links to live Internet sites or pages. All linked information must be contained within your electronic report, and be accessible offline.

(4) Other electronic formats. Before preparing your report in any other electronic format, please e-mail the COR, with an e-mail copy-furnished to amsta-idq@tacom.army.mil, to obtain a decision as to the formats acceptability. This e-mail must be received by the COR not later than ten calendar days before the draft reports due date. All alternate methods must be a no cost to the Government.

NOTES: (a) The above formats may be submitted in compressed form using self-extracting files.

(b) Files may be read-only, password protected.

e. Acceptable media: The Contractor shall submit reports via e-mail. If e-mail is not workable, other acceptable media include 100 or 250 Megabyte Zip*-disk, 3 inch disk, or 650 megabyte CD ROM. Identify the software application and version used to create each file submitted.

(1) E-MAIL. Maximum size of each e-mail message shall be three and one-half (3.5) megabytes. Any compressed files must be self-extracting, and you must provide appropriate instructions. You may use multiple e-mail messages if necessary, however, you must annotate the subject lines in this manner: Message 1 of 3, 2 of 3, 3 of 3.

(2) 100 or 250 MEGABYTE ZIP*-DISK, 3 INCH DISK, OR 650 MEGABYTE CD ROM via U.S. Mail or other carrier. The Contractor shall label all submitted disks with the Contract number, the Contractors name and address, and a contacts phone number.

NOTE: Please select only one medium by which to transmit each report. For instance, do not submit a report via e-mail and 100 megabyte Zip*-disk.

* Registered Trademark

18. ESTIMATED TOTAL PRICE :17. PRICE GROUP: 1. DATA ITEM NO.: A0022. TITLE OF DATA ITEM: Scientific and Technical Reports
3. SUBTITLE : Phase I Draft and Final Technical Reports4. AUTHORITY: DI-MISC-80711A 5.
CONTRACT REFERENCE: Section C.2.b. 9. DIST. STATEMENT REQUIRED.: 12. DATE OF FIRST SUB: See Block 16 6. REQUIRING OFFICE
.....: AMSTA-TR-R 10. FREQUENCY: See Block 16 13. DATE OF SUBS. SUB.: See Block 16 7. DD250
REQ: DD 11. AS OF DATE: See Block 16 8. APP CODE
.....: B. COPIES:DRAFTFINAL14. DISTRIBUTION A. ADDRESSEES
Terence Burke, Contracting Officers Representative (COR), E-mail: burkete@tacom.army.mil

15. TOTAL: 1 1 * * In distributing electronic copies of the final report, according to the schedule in Block 16 below, the Contractor shall deliver one (1) copy to the Government, sent to Terence Burke, Phil Lawrence, and Ed Young e-mail addresses.16. REMARKS:

a. Basic Period: The Contractor shall deliver one (1) draft Scientific and Technical Report, five (5) months and one (1) week after contract award. The draft report shall include a completed Standard Form (SF) 298 (Report Documentation Page) as the reports cover sheet. The COR shall review the draft report and return it to the Contractor within seven (7) days of receipt with comments. The Contractor shall submit one (1) final Scientific and Technical Report (with the completed SF 298) within fourteen (14) days after receipt of draft comments.

b. Option Period: If the Government exercises the option before the end of the Phase I Basic Period, the Contractor shall deliver one (1) draft Scientific and Technical Report (with a completed SF 298) within three (3) months and one (1) week after the end of the Phase I Basic Period. If the Government exercises the option after the end of the Phase I Basic Period, the Contractor shall deliver one (1) draft Scientific and Technical Report (with a completed SF 298) within three (3) months and one (1) week after the option exercise date. The COR shall review the draft report and return it to the Contractor within seven (7) days of receipt with comments. The Contractor shall submit one (1) final Scientific and Technical Report (with the completed SF 298) within fourteen (14) days of receipt of draft comments.

Note: The Phase I, Option Period Scientific and Technical Report can be an addendum to the Phase I, Basic Period Scientific and Technical Report, but it must discuss the work accomplished during the Phase I, Option Period, and explain how the Option Period effort ties into the Basic Period work and the planned Phase II effort.

c. These instructions apply to both Basic Period and Option Period Technical Reports: Complete the reports IAW DID DI-MISC 80711A, Scientific and Technical Reports.

The COR is responsible for accepting or rejecting the draft and final reports, and for submitting the approved final report to the Defense Technical Information Center (DTIC), in Ft. Belvoir, VA. See the data item description (DI-MISC-80711A), at the internet address below, for instructions on completing the required report. (Note Tailoring: Insert tailoring instructions, if any)

<http://astimage.daps.dla.mil/docimages/0002\27\88\80711A.PD4>

You may download the SF 298 form, from the following internet address:

<http://www.dtic.mil/dtic/forms/sf298template.doc>

You may download basic instructions for completing the SF 298 form, from the following internet address:

http://www.dtic.mil/dtic/forms/SF298_MS67.doc

Here are some additional instructions for completing the SF 298 form, that apply when submitting reports under the SBIR Program:

For each unclassified report, the Contractor shall fill in Block 12a (Distribution/Availability Statement) of the SF 298 with one of the following statements:

(a) Approved for public release; distribution unlimited.

(b) Distribution authorized to U.S. Government Agencies only; contains proprietary information

Note: After reviewing the Contractors entry in Block 12a, TACOM has final responsibility for assigning a distribution statement.

Block 13 (Abstract) of the SF 298 must include the first sentence, Report developed under SBIR contract for topic (insert topic number) . The abstract must identify the purpose of the work and briefly describe the work carried out, the finding or results, and the potential applications of the effort. Since the Department of Defense (DOD) will be publishing the abstract, it must not contain any proprietary or classified data.

Block 14 (Subject Terms) of the SF 298 must include the term SBIR Report.

d. Prepare the reports in the Contractors format. Submit the reports using any of the following electronic formats:

(1) Files readable using these Microsoft* 97 Office Products (TACOM can currently read OFFICE 97* and lower): Word, Excel, PowerPoint, or Access. Spreadsheets must be sent in a file format that includes all formulae, macro and format information. Print image is not acceptable. Executable files, other than self-extracting compressed files, are unacceptable.

(2) Files in Adobe PDF (Portable Document Format). Scanners should be set to 200 dots per inch.

(3) Files in HTML (Hypertext Markup Language). HTML documents must not contain active links to live Internet sites or pages. All linked information must be contained within your electronic report, and be accessible offline.

(4) Other electronic formats. Before preparing your report in any other electronic format, please e-mail the COR, with an e-mail copy-furnished to amsta-idq@tacom.army.mil, to obtain a decision as to the formats acceptability. This e-mail must be received by the COR not later than ten calendar days before the draft reports due date. All alternate methods must be a no cost to the Government.

NOTES: (a) The above formats may be submitted in compressed form using self-extracting files.

(b) Files may be read-only, password protected.

e. Acceptable media: The Contractor shall submit reports via e-mail. If e-mail is not workable, other acceptable media include 100 or 250 Megabyte Zip*-disk, 3 inch disk, or 650 megabyte CD ROM. Identify the software application and version used to create each file submitted.

(1) E-MAIL. Maximum size of each e-mail message shall be three and one-half (3.5) megabytes. Any compressed files must be self-extracting, and you must provide appropriate instructions. You may use multiple e-mail messages if necessary, however, you must annotate the subject lines in this manner: Message 1 of 3, 2 of 3, 3 of 3.

(2) 100 or 250 MEGABYTE ZIP*-DISK, 3 INCH DISK, OR 650 MEGABYTE CD ROM via U.S. Mail or other carrier. The Contractor shall label all submitted disks with the Contract number, the Contractors name and address, and a contacts phone number.

NOTE: Please select only one medium by which to transmit each report. For instance, do not submit a report via e-mail and 100 megabyte Zip*-disk.

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